

**REMARKS**

Claims 1-31 are now pending in the application. Pending claims 1-31 stand rejected under 35 U.S.C. § 103 (a). Applicants acknowledge the Examiner for the telephonic interview conducted on November 9, 2005. The following remarks are considered by Applicants to overcome each rejection raised by the Examiner and to place the application in condition for allowance. An early Notice of Allowance is therefore requested.

**I. Rejection of Pending Claims 1-31 Under 35 U.S.C. § 103 (a)**

Claims 1-4 stand rejected as being unpatentable over Stengel et al. in view of Aoyama. Claims 5-8 stand rejected as being unpatentable over Stengel in view of Aoyama and further in view of Burden (2004/0171226) published on September 2, 2004 (“Burden”). Claims 9-18 were rejected over Stengel in view of Aoyama and further in view of Kelsey et al. The Examiner also rejected claims 19-31 citing Stengel in view of Aoyama and further in view of Mulligan et al. This rejection is traversed and believed overcome in view of the following discussion.

**A. Summary of Cited References**

Stengel is directed to a structure and method for fabricating semiconductor structures utilizing the formation of a substrate including an isotopically enriched material. More specifically, Stengel discloses an amorphous intermediate layer 58 that is grown on a substrate 52 at the interface between substrate 52 and a growing accommodating buffer layer 54 which is a monocrystalline crystal oxide layer.

Aoyama discloses a multi-component piezoelectric ceramic material. Aoyama further discloses that the multi-component based ceramic is used to improve the electromechanical properties. More specifically, Aoyama discloses a PZT crystal having a PZT piezoelectric substance with a large piezoelectric constant.

Burden discloses a semiconductor wafer structure having a device layer, an isotopically enriched insulating layer, and a substrate. Burden also discloses that the silicon is composed of three stable isotopes which contribute to the photon scattering which

decreases the thermal conductivity of naturally occurring silicon. Burden discloses the use of the Si28 isotope.

Kelsey is directed to isotopically enriched optical materials. The optical materials provide high isotopic purity silica, calcium, zinc, gallium and germanium materials with increased resistance to optical damage. More specifically, Kelsey discloses the use of Si29 and Si30 isotopes.

Mulligan discloses a multi-function composite structure. Mulligan is directed to multi-function structures capable of more than one discrete function and to fibrous monolith processing techniques for fabricating different types of devices.

**B. Argument**

**1. Rejection of pending claims 1-4 under 35 U.S.C. 103(a) as being unpatentable over Stengel in view of Aoyama.**

The Examiner asserts that Stengel teaches all the features recited in claims 1-4 except an oxide material being piezoelectric. The Examiner utilizes Aoyama to disclose a piezoelectric element. Applicant respectfully disagrees with the Examiner's analysis.

Since claims 2-4 depend from independent claim 1, Applicant will address independent claim 1 first. Claim 1 recites a device comprising an isotopically enriched piezoelectric material. It is respectfully submitted that the cited references fail to teach or suggest the features recited in claim 1.

As mentioned above, Stengel discloses a structure and method for fabricating a semiconductor. Aoyama discloses a ceramic material having a piezoelectric element. It is submitted that there is no motivation or even a suggestion to combine the teachings of Stengel and Aoyama.

It was respectfully submitted to the Examiner during the Interview that there is no motivation to combine the teachings of Stengel and Aoyama. It is further submitted that Aoyama is a Japanese patent and only an abstract is provided. The abstract of Aoyama does not provide any suggestion or motivation that the piezoelectric material can be combined with the semiconductor structure of Stengel. It is also submitted that the Examiner admitted

that by the abstract of Aoyamo, there is no motivation or suggestion to combine the teachings of Aoyamo with that of Stengel. The Examiner further indicated he would review the translation of Aoyamo to determine if the any motivation to combine is provided. Applicants respectfully submit that no such motivation exists since Aoyama is related to a device for improving the electromechanical properties rather than in the manufacturing of a semiconductor device. Therefore, Applicants respectfully submit that the there is no motivation to combine the cited references. Furthermore, even if there is motivation provided, the cited references in combination fail to teach or suggest all the features of the claimed invention.

Specifically, the claimed invention provides the benefit of limiting the phonon scattering and increasing thermal conductivity through the use of isotopically enriched materials in the manufacturing of synthetic piezoelectric materials. The cited references fail to mention the problem the claimed invention overcomes or even suggest how the problem can be solved.

Stengel is directed to solving a need that exists for a semiconductor structure that provides a high quality monocrystalline film or layer over another monocrystalline material and a process for making such a structure. Aoyama indicates that the problem to be solved is to obtain ceramic material by setting the content of an isotope at a specific level to improve the electromechanical properties. Neither Stengel nor Aoyamo suggest the problems the present invention is overcoming. Moreover, the cited references fail to mention or suggest the benefits provided by the claimed invention.

Therefore, it is submitted that claims 1-4 recite subject matter that is neither taught nor suggested by the applied references. Accordingly, Applicant requests the withdrawal of the rejection of claims 1-4 under 35 U.S.C. 103(a).

Applicant also submits that the Examiner has not established a *prima facie* case of obviousness of claims 2-4 under 35 U.S.C. § 103(a). In particular, rejected claims 2-4 by virtue of their dependency from claim 1 are similarly considered by Applicant to be patentable.

**2. Rejection of pending claims 5-8 Under 35 U.S.C. 103(a) as being unpatentable over Stengel in view of Aoyama and further in view of Burden.**

The Examiner indicates that combination of the cited references teach or suggest the claimed invention. Moreover, the Examiner takes the position that Burden cures the deficiencies of Stengel and Aoyama. Specifically, the Examiner states that Burden discloses an isotopically pure silicon-on-insulator wafer and method of making the wafer using the Si28 isotope. Applicant respectfully disagrees that the cited references teach or suggest the claimed invention. Applicant traverses the rejection of claims 5-8 under 35 U.S.C. 103(a).

Claims 5-8 are dependent upon claim 1. It is respectfully submitted that the combination of the cited references fail to teach or suggest the features recited in independent claim 1. Even though Burden discloses the use of the specific type of isotope, there is no suggestion that the Si28 isotope may be used in piezoelectric devices. It is respectfully submitted that Burden does not teach or suggest a semiconductor device having a piezoelectric element as recited in claim 1, Applicant requests that the rejection of claims 5-8 be withdrawn for at least that reason.

**3. Rejection of claims 9-18 under 35 U.S.C. 103(a) as being unpatentable over Stengel in view of Aoyama and further in view of Kelsey.**

The Examiner takes the position that Kelsey cures the deficiencies of Stengel and Aoyama. Specifically, the Examiner states that Kelsey discloses the use of isotopically engineered optical materials where the required Si29 and Si30 isotopes are used. Applicant respectfully disagrees that the cited references teach or suggest the claimed invention. Applicant traverses the rejection of claims 9-18 under 35 U.S.C. 103(a).

Claims 9-18 are dependent upon claim 1. It is respectfully submitted that the combination of the cited references fail to teach or suggest the features recited in independent claim 1. Kelsey does not teach or suggest a semiconductor device having a piezoelectric element as recited in claim 1, Applicant requests that the rejection of claims 9-18 be withdrawn for at least that reason. Moreover, there is no suggestion or motivation to combine the teachings of Stengel with that of Aoyama and Kelsey to teach the claimed

invention. Therefore, it is submitted that the cited references fail to teach or suggest the claimed invention as recited in claims 9-18. As a result, Applicant requests the withdrawal of the rejection of claims 9-18 under 35 U.S.C. 103(a).

**4. Rejection of claims 19-31 under 35 U.S.C. 103(a) as being unpatentable over Stengel in view of Aoyama and further in view of Mulligan.**

The Examiner takes the position that Mulligan cures the deficiencies of Stengel and Aoyama. Specifically, the Examiner states that Mulligan discloses multi-functional composite structures as recited in claims 19-31. Applicant respectfully disagrees that he cited references teach or suggest the claimed invention. Applicant traverses the rejection of claims 19-31 under 35 U.S.C. 103(a).

Claims 19-31 are dependent upon claim 1. It is respectfully submitted that the combination of the cited references fail to teach or suggest the features recited in independent claim 1. More specifically, since Mulligan does not cure the deficiencies of Stengel and Aoyama, it is respectfully submitted that the cited references fail to teach or suggest the features recited in claims 19-31. More specifically, since Mulligan fails to teach or suggest a semiconductor device having a piezoelectric element as recited in claim 1, Applicant requests that the rejection of claims 19-31 be withdrawn for at least that reason.

**C. Conclusion**

For the reasons presented above, claims 1-31 are believed by Applicant to define patentable subject matter and should be passed to issue at the earliest possible time. A Notice of Allowance is requested.

Respectfully submitted,

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